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SUBJECT: Designation of Areas to Be Excavated at the Export Plant and Screening Plant at the Libby Asbestos Site, Libby, Lincoln County, Montana

The National Contingency Plan (NCP) at 40 CFR Part 300, Subpart E outlines the criteria for identifying the need to undertake or order a response action; provides the overall goals in undertaking such an action; and lists some typical and appropriate response actions (which includes the excavation of contaminated soil). The NCP directs that response actions take reasonable steps to reduce, minimize, or eliminate the threats posed by the release of hazardous substances. As has been well documented in the Action Memorandum 23 May 2000, and the documents attached thereto, there is a need to remove asbestos contaminated soils and vermiculite from the Export Plant and Screening Plant within the Libby Asbestos Site ("Site" or "LAS") in Libby, Montana. This memorandum provides the basic rationale for the designation of the areas to be excavated as part of the Fund Lead action at the Screening Plant, and the UAO Scope of Work at the Export Plant.

General Discussion

There are not established numeric action levels or clean-up targets in terms of asbestos concentrations in soils or solid media for use at Superfund Removal sites. Historically, clean-up numbers have ranged from the high end of up to 1% asbestos by weight by Polarized Light Microscopy (PLM) (Southern Asbestos Site, Atlas Mine) to significantly less than 1% (Diamond XX), largely depending on the physical setting and land use. The 1% by PLM standard is typically a straight adaptation of the TSCA definition of Regulated Asbestos Contaminated

Material (RACM). The use of the definition of RACM is problematic for the Libby Asbestos Site for a number of reasons:

1. The 1% by PLM is not risk derived, but is based on the quantification limit of the PLM method.

2. The RACM definition is most directly applicable to chrysotile based construction materials in buildings in controlled situations. This contrasts to the Libby Asbestos Site, where asbestos contamination is in soils, largely uncontrolled, and in high traffic areas, where wind and rain tend to spread the asbestos about. Given the direct contact, and resulting disturbance at LAS, there is a much higher probability of generating airborne asbestos fibers at the Screening and Export Plants than in a situation involving manufactured chrysotile products. Also, the vast majority of current research literature indicate that amphibole asbestos, such as those found in Libby, has a higher toxicity than chrysotile.

3. All of the laboratories used to analyze solid matrix samples from Libby have reported great difficulty in seeing and counting the amphibole asbestos fibers by PLM. This is in large part due to the straight, long, and thin nature of the amphibole fibers found in Libby. In many cases samples reported to be non-detect by PLM have showed the presence of abundant amphibole fibers when screened by infrared spectroscopy (IR) and/or a Scanning Electron Microscope (SEM). Currently, the EPA, in conjunction with the USGS and NIST, is working on a Performance Evaluation Study (PE) for quantitative SEM and IR methodologies which will give a better tool for characterizing the asbestos content in solid matrices in Libby.

4. The Region is currently in the process of updating the Risk Assessment Methodology for asbestos sites, which is scheduled to go through a formal peer review this summer. While the levels of asbestos, and hence the risk the posed, at the Export and Screening Plants clearly warrant action, the risk at other areas in Libby, including at some of the areas surrounding the two former plants is not as clear. It is anticipated that the updated Risk Assessment Methodology will provide a more workable approach for these areas of more subtle exposure, and be far more reliable than the somewhat arbitrary 1% by PLM approach.

5. There is no ability using PLM to quantify more accurately the level of asbestos fibers reported "trace" or <1% by PLM. This number could mean concentrations ranging from 0.01%, to 0.99%. Depending on which end of this range a sample truly fell, there would be manifestly different residual risk if the arbitrary standard of 1% by PLM was used as the action level or clean-up number. This is different from most clean up numbers, where the target can be measured objectively within a known bound of analytical error.

Given these constraints on the use of a fixed, concentration based, clean-up target, I have targeted the areas designated for clean-up by using a total mass based removal approach. This risk management approach has been used successfully on enumerable sites, including many that I have worked on directly (e.g.-LCP Chemical Site, ILCO Site, Terry Creek Site). It is especially useful at sites were bright line risk levels do not exist at the lower risk end, or where there is quantitative analytical uncertainty at the concentrations in question. This approach relies on three basic points:

1. Total risk is proportional to the total mass of contaminants present. That is, for a given exposure scenario the more contaminant present, the higher the risk. Consequently, actions designed to remove the highest mass of contaminants for the effort taken maximizes risk reduction per unit cost expended. This also avoids the issue of whether concentrations bracketing a clean-up goal still pose a significant threat. For example, using a clean-up target of 500 ppm for a given contaminant requires stating unequivocally that an entire area at 499 ppm is completely safe, while a single point at 501 ppm is completely unsafe. The net effect of this is to drive the clean-up target down so low as to provide a wide margin of safety to be able to conclude that an entire area at X concentration poses no risk.

2. Removal efficiency (and hence risk reduction) can be gauged as a function of the percentage mass of contaminants removed. For example, assume a 6 acre site contains an estimated 10,000 pounds of a given contaminant, but that 8,000 pounds are within 2 acres (such as in the immediate vicinity of a processing area), and that another 1,500 pounds lie within an additional acre. The calculation can be made that there is an 80% reduction for excavating the first two acres. An additional 15% (95% total) can be removed by adding the additional acre. However, by adding the last three acres (doubling the size and cost of the excavation) only an additional 5% of the total contaminants are removed.

3. In order to ensure cost effectiveness, the function of pound of contaminant removed per unit volume of soil(or unit area, or unit cost) should be evaluated (numerically if possible) to identify the breakpoint for diminishing returns. For example, at the LCP Site (the Contaminants of Concern were PCBs and Hg) we took the area of concern (roughly 450 acres of marsh) and broke it into 100 sub areas. Of the 450 acres there were obvious high concentrations in an area of roughly 7 acres (>1000 ppm Hg or PCBs), but the contaminant levels dropped off to relatively low levels (<5 ppm Hg or PCBs) over some distance. For each of the sub areas we calculated an average concentration for successive one foot intervals of depth. Then for each of these one foot intervals we calculated the total mass of PCBs and Hg. The next step was to then arrange these areas in order of ascending mass of PCBs and Hg and then plot the cumulative mass of the two contaminants removed as each area and interval was added. From this analysis it became clear

that over 60% of the contaminants lay in the 7 acres within a depth of 2 feet, and 85% of the contaminants were within a 13 acre area within a depth of 2 feet, but the remaining 15% were scattered over the remaining 437 acres. Therefore, the 13 acres were targeted for removal while monitoring was proposed for the remainder. To be sure, there was residual contamination left, and some at concentrations above risk derived numbers from other sites (1 to 50 ppm PCBs or Hg). However, this analysis showed that while excavating these additional areas and/or depths greatly increased the cost of the project, they only marginally reduced the incremental amount of residual risk.

There is some difficulty in applying this technique numerically to either the Export Plant or the Screening Plant. This is due to the fact that the values reported as "trace" or <1% by PLM cannot be quantified further, thus making it impossible to tabulate average concentrations, or total masses within a given area. However, a qualitative use of this approach can nonetheless establish a reasonable basis for establishing the areas to be excavated,until such time as the analytical techniques can be better refined, or the Asbestos Risk Assessment Methodology update is finalized. At the LCP Site a qualitative analysis of an ARC View based GIS map of the concentration data, simply looking for natural "break points" in the concentrations, yielded the identical target areas as the more rigorous numerical analysis. Taking this approach at the Libby Asbestos Site will allow for the elimination of the clear and obvious risks shown at the Screening Plant and Export Plant in the near term, while the questions over the long term, residual risk are resolved. Below is a discussion of my analysis at both the Export Plant and Screening Plant.

__Export Plant__

In looking at the attached data map for the export plant, there is one obvious trend in the PLM data. While there are trace to percentage levels of asbestos over the surface of the former operational areas of the Export Plant (generally to the south side of the area), the area over the old ballfields (generally to the north) are mostly non-detect to trace levels by PLM (see attached figure). This leads to the conclusion that there is a much larger mass of asbestos fibers on the former operating portions of the of the Plant, than on the more outlying ballfields. This is consistent with the operational history of the Export Plant, descriptions provided by the current owners (City of Libby), the current property tenants (Mill Works West), and on-site observations. One area moving north from the Export Plant into centerfield of the eastern most ballfield appears to have much higher levels of asbestos. This area has been described by a number of people as a former low area that has been backfilled with unexfoliated vermiculite. This area is targeted for test trenching and further evaluation, and will be delineated through that effort during the removal action.

Within the bounds of the operational area of the Export Plant there are no readily discernible trends in the data. Any sample designated <1% by PLM is adjacent to a sample at >1% by PLM, with the exception of one point at the southeast edge of the property. It is as likely that this variability is as much a function of the uncertainties of the quantification abilities of the

PLM methodology, as it is any real difference in asbestos concentrations.

In reviewing the opinions of Dr. Weis, the Regional Toxicologist, Dr. Miller, U.S. Public Health Service, and those contained in the Health Consultation prepared by the Agency for Toxic Substances and Disease Registry (see Action Memo-Attachment 2) it is clear that the entire operating area of the former Export Plant acts as a source for potential airborne fibers. It is also the case that the fibers at or near the surface pose the greatest risk, and that the unexfoliated vermiculite acts as a large source of asbestos fibers wherever it is found.

Based on the above information I have targeted the excavation at the Export Plant to accomplish the following goals:

1. Remove the vast majority of the asbestos fibers from the surface of the Export Plant by excavating over the entire area encompassed in the former operations area (see marked area in attached figure). This will leave a residual risk due to "trace" levels of fibers by PLM remaining on the northwest portion of the area in question. However, this is an incrementally smaller risk than posed by the operating areas of the Export Plant, due to the correspondingly smaller mass of fibers contained in this area. In any event, the need to include this area in an excavation can be revisited after the completion of the update of the Asbestos Risk Assessment Methodology, and the completion of the PE Study for the SEM and IR methods.

2. In the designated area remove the asbestos contaminated soils to a depth of 18 inches where present, shallower in areas where the contamination is confined to the immediate surface. This again will remove the vast majority of the fibers from the area, and eliminate the threat of surface contact. This incorporates the logic used in Agency guidance documents concerning heavy metal contaminated soils (where groundwater contamination is not a concern) in defining 12-18" as the appropriate excavation interval for eliminating surface contact and the threat of "turning up" sub-surface soils to the surface. Residual contamination left at a depth of 18" and deeper (after backfilling) will not pose a substantial risk of direct contact, nor act as a source for the spread of contamination.

3. In areas where there is readily visible amounts of unexfoliated vermiculite, and hence, likely percentage levels of asbestos, the excavation shall continue to depths past 18" until sampling shows either non-detectable levels of fibers, or that there are no longer visible amounts of unexfolliated vermiculite present. The unexfolliated vermiculite has clearly acted as an asbestos source for the spread of contamination, and it would be prudent to eliminate the presence of these high mass source areas.

Screening Plant

The general approach for the excavation at the Screening Plant is in parallel with that at Export Plant. That is, there will be a removal of all unexfoliated vermiculite to the extent practical and, a removal of contaminated soils to a depth of 18". However, the contamination at the Screening Plant pervasively covers a much larger area than the Export Plant, spreading over property owned by four different entities between the Kootenai River and Highway 37, and in two small piles across the Kootenai River above the old rail loading station. By and large the excavation will cover the entire area on three of the four parcels of land between Highway 37 and the River. It is possible that a small area just to the southeast of Rainy Creek on the Parker's property (see attached data map) can be isolated and not excavated with the collection of more sample points. I am not sure whether this is possible, nor even worth the effort given the cost and uncertainty of PLM sampling, and the concern over tracking contamination through this area. Furthest to the southeast, on the parcel owned by KDC, the contamination appears to be confined to some areas where the unexfoliated vermiculite was used as backfill. On this parcel, as with the two piles across the river the excavation will focus on removing the source area of asbestos, largely contained in the unexfoliated vermiculite.

Summary

The steps outlined above offer a reasonable guideline for removing asbestos contaminated soils and vermiculite from the Export Plant and Screening Plant. These excavations will remove a high percentage of the asbestos contamination present, and thus greatly reduce the threat to public health and welfare or the environment found on the Libby Asbestos Site. The actions are designed to be cost effective, maximizing threat reduction per unit cost. They are consistent with the response actions to releases of hazardous substances outlined in the National Contingency Plan in 40 CFR Part 300, Subpart E.

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